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Indian Standard

SPECIFICATION FOR FILTER AID POWDER FOR USE IN ELECTROPLATING

UDC 66·067·3 : 627·357·7

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 5

August 1983

Indian Standard

SPECIFICATION FOR FILTER AID POWDER FOR USE IN ELECTROPLATING

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Indian Standard

SPECIFICATION FOR FILTER AID POWDER FOR USE IN ELECTROPLATING

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 15 January 1983, after the draft finalized by the Electroplating Chemicals Sectional Committee had been approved by the Chemical Division Council.

0.2 In modern electroplating the purity of electrolytes is very important since any suspended impurities impair the appearance and quality of the electroplated surface. In order to get rid of these impurities electrolyte solutions are passed through a suitable medium, such as paper, cloth, stone or porous carbon which can pass the solution at a practical rate. Filter aids are used to avoid rapid plugging of these filter media.

0.3 Filter aids consist of diatomaceous earth, asbestos fibres, paper pulp, cellulose powders, etc. The above media act as a support for the filter aid. For this purpose a single medium is frequently used that consists of a disposable disc of asbestos or a cylinder of wound yarn. The type of the support, the media and the filter aid depend on the construction and method of filtration.

0.4 In electroplating industry generally diatomaceous earths are used as filter aids which are available in different degrees of fineness. The fine type is generally used for acid solutions for greater clarity and the coarse type is used for alkaline solutions.

0.5 Diatomaceous earth is silicious and therefore should not be used for filtering baths containing hydrofluoric acid or highly alkaline solutions.

0.6 Filter aids may be used for filtering electroplating solutions either with or without activated carbon powder for effective removal of suspended impurities. Filter aid charges may be used in quantities of 750 g to 3·5 kg per square metre or in layers of 1·5 to 3 mm thickness.

0.7 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and the methods of sampling and test for filter aid powder used in clarifying electroplating solutions.

2. TYPES

2.1 There shall be two types of filter aid powder as follows:

Coarse Type — for alkaline electroplating solutions, and

Fine Type — for acidic electroplating solutions.

3. REQUIREMENTS

3.1 Description — The material shall be in the form of fine white or off colour powder, free from foreign matter and it shall be capable of taking up and holding water about four times its mass. The material may be generally insoluble in water, dilute acids and alkalis.

3.2 The material shall also conform to requirements given in Table 1, when tested in accordance with the methods prescribed in col 5 of the table.

3.3 The material shall also conform to the requirement of other metallic impurities as agreed to between the purchaser and the supplier.

4. PACKING AND MARKING

4.1 Packing — Unless otherwise agreed to between the purchaser and the supplier, the material shall be packed in clean, sound, hermetically sealed drums or suitable bags.

4.2 Marking — The packages shall be legibly and indelibly marked with the following information:

a) Name and type of the material;

b) Net mass of the contents;

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*Rules for rounding off numerical values (*revised*).

TABLE 1 REQUIREMENTS FOR FILTER AID POWDER FOR ELECTROPLATING

(*Clause* 3.2)

SL No.	CHARACTERISTICS	COARSE TYPE	FINE TYPE	METHODS OF TEST	
				Ref to IS :	Appendix A
(1)	(2)	(3)	(4)	(5)	(6)
i)	Moisture, percent by mass, *Max*	1·0	0·5	3 of IS : 877-1977*	
ii)	Ignition loss, percent by mass, *Max*	0·2	0·2	—	A-2
iii)	Silica (as SiO_2), percent by mass, *Min*	89·6	89·6	4 of IS : 488-1980†	
iv)	Relative density at 27/27°C	2·3	2·3	A-5 of IS : 505-1978‡	
v)	Dry bulk density, (g/ml), *Max*	0·20	0·20	A-4.2 of IS : 1420-1972§	
vi)	*p*H	4 to 6	8 to 9	8 of IS : 877-1977*	
vii)	Particle size, percent by mass, *Min*			—	A-3
	a) Passing through 212 micron IS sieve	100	—		
	b) Passing through 180 micron IS sieve	95	—		
	c) Passing through 150 micron IS sieve	—	100		
	d) Passing through 125 micron IS sieve	—	95		
viii)	Metallic impurities percent by mass, *Max*:				
	a) Iron (as Fe_2O_3)	1·3	1·3	—	A-4
	b) Titanium (as TiO_2)	0·2	0·2	—	A-5
	c) Phosphorus (as P_2O_5)	0·2	0·2	—	A-6
	d) Calcium (as CaO)	0·5	0·5	—	A-7
	e) Magnesium (as MgO)	0·6	0·6	—	A-8

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*Methods of sampling and test for activated carbons, powdered and granular (*first revision*).

†Glass making sands (*second revision*).

‡Light kaolin (*second revision*).

§Light basic magnesium carbonate (*first revision*).

c) Month and year of manufacture;

d) Manufacturer's name and/or his recognized trade-mark, if any; and

e) Lot number to enable the batch of manufacture to be traced from records.

4.2.1 The packages may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

5. SAMPLING

5.1 The method of drawing representative samples of the material from a lot, the number of tests to be performed and the method of determining the criteria for conformity of the material to the requirements of this specification shall be as prescribed in Appendix B.

APPENDIX A

(*Clause* 3.2 and *Table* 1)

METHODS OF TEST FOR FILTER AID POWDER FOR ELECTROPLATING

A-1. QUALITY OF REAGENTS

A-1.1 Unless specified otherwise, pure chemicals and distilled water (*see* IS : 1070-1977*) shall be employed in tests.

NOTE — ' Pure chemicals ' shall mean chemicals that do not contain impurities which affect the results of analysis.

A-2. LOSS ON IGNITION

A-2.1 Procedure — Take about 50 g of the material in a porcelain dish and heat to constant mass at 105 ± 2°C. Cool it in a desiccator and keep for subsequent tests.

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*Specification for water for general laboratory use (*second revision*).

A-2.2 Heat 1 g of the above dried material in a platinum crucible for 15 minutes over a small flame, then for 30 minutes over good Maker burner, with the lid on for at least 10 minutes. Cool the crucible and contents in a desiccator, weigh, again heat for 10 minutes over the Meker burner and then weigh again after cooling. The loss in mass denotes loss on ignition and the percentage of loss may be calculated.

A-2.3 Calculation

$$\text{Loss on ignition, percent by mass} = \frac{100\ M}{M_1}$$

where

M = loss in mass in g, and

M_1 = mass in g of the material taken for the test.

A-3. SIEVE ANALYSIS

A-3.0 Principle of the Method — The material is sieved through standard sieves and percent of the material passing through various sieves calculated.

A-3.1 Apparatus

A-3.1.1 *Camel Hair Brush*

A-3.1.2 *Rubber Cushion or Thick piece of Flat Rubber*

A-3.1.3 *Test Sieves* — IS Sieves 212 µm, 180 µm, 150 µm and 125 µm [*see* IS : 460 (Part I)-1978*].

A-3.1.3.1 *Mechanical shaker* — Whenever possible a mechanical shaker may be used.

A-3.2 Procedure — Clean and thoroughly dry the sieves before use. Adjust the sieves in order with 212 µm IS Sieve on top for Type 1 or 150 µm IS Sieve for Type 2. Weigh accurately 100 g of the well-mixed material and transfer it into the top sieve. Shake the sieve simultaneously and occasionally tap the bottom sieve on the rubber cushion. When the portion of the material passing through the bottom sieve appears to be negligible (less than 0·2 g per minute of shaking), remove the top sieve and shake this sieve separately over a clean, white glazed paper to ensure that no more of the material passes through. Using the camel hair brush, transfer from the paper any material that has passed through the 212 µm IS Sieve to 180 µm IS Sieve. Repeat the same procedure with 180 µm

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*Specification for test sieves: Part I Wirecloth test sieves (*second revision*).

IS Sieve or 125 µm IS Sieve, as the case may be. Transfer the residue remaining on each sieve to convenient tared containers with the aid of a camel hair brush, and weigh each separately.

A-3.3 Calculation

Material retained on or passing through any given sieve, percent by mass = Mass in g of the material retained on or passing through the given sieve.

A-3.3.1 The sum of the percentage of the material retained on both the sieves, plus the percentage passing through the second sieve shall be 100.

A-4. DETERMINATION OF IRON OXIDE

A-4.0 Outline of the Method — The orange-red complex, produced by ferrous iron on addition of O-phenanthroline, is determined photometrically at approximately 510 nm.

A-4.1 Reagents

A-4.1.1 *Dilute Sulphuric Acid* — 1 : 1 (*v*/*v*).

A-4.1.2 *Hydrofluoric Acid* — 40 percent (*v*/*v*).

A-4.1.3 *Dilute Hydrochloric Acid* — 1 : 1 (*v*/*v*).

A-4.1.4 *Tartaric Acid Solution* — 10 percent (*m*/*v*) in water.

A-4.1.5 *Hydroxylamine Hydrochloride Solution* — Dissolve 1 g of the reagent in water and dilute to 100 ml.

A-4.1.6 *Phenanthroline Solution* — Dissolve 1 g of O-phenanthroline monohydrate in 90 ml of water with gentle heating and constant stirring. Cool and dilute to 100 ml with water.

A-4.1.7 *Acetate Buffer Solution* — Dissolve 21·5 g of sodium acetate ($CH_3COONa\cdot3H_2O$) in 300 ml of water containing 2 ml of glacial acetic acid and dilute to 1 000 ml with water.

A-4.1.8 *Standard Iron Solution* — Dissolve 7·02 g of ammonium ferrous sulphate [$(NH_4)_2SO_4\cdot FeSO_4\cdot6H_2O$] in water containing 10 ml of concentrated sulphuric acid and dilute with water to 1 000 ml. Dilute 20 ml of this solution to 1 000 ml with water just before use. One millilitre of this diluted solution is equivalent to 0·02 mg of iron (as Fe).

A-4.2 Preparation of Sample Solution — Weigh accurately about 2 g of the dried material in a platinum dish. Moisten the sample with 5 ml of water. Add 3 ml of dilute sulphuric acid and 20 ml of hydrofluoric acid and evaporate to dryness on the sand bath in a fume cupboard, taking care to avoid spurting. Cool and repeat the process of evaporation twice with another 10 ml of hydrofluoric acid each time. Cool, add 2 ml of dilute sulphuric acid and evaporate as before. Heat the dry residue cautiously until fumes of sulphur trioxide cease. Ignite the residue at 1 000°C for five minutes and cool. Fuse the residue with 3 g of anhydrous sodium carbonate, cool the fused mass and dissolve it in 25 ml of dilute hydrochloric acid and dilute with water to 250 ml in a volumetric flask. Reserve the solution for determination of iron and titanium.

A-4.3 Preparation of Blank Solution — Prepare the blank solution following the procedure and using the same quantities of reagents given in **A-4.2** but without the material and dilute the solution with water to 250 ml in a volumetric flask.

A-4.4 Procedure — Transfer 5 ml aliquot of the sample solution prepared in **A-4.2** to a 50-ml volumetric flask. Add 2 ml of tartaric acid solution and 2 ml of hydroxylamine hydrochloride solution. Stir and add 5 ml of O-phenanthroline solution followed by 10 ml of acetate buffer solution. Mix the contents, allow to stand for 15 minutes and dilute with water up to the mark.

A-4.4.1 Transfer 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 ml of the standard iron solution to eleven 50-ml volumetric flasks. Add 5 ml of the blank solution in place of the sample solution and the same quantities of reagents as in **A-4.4** to each of the volumetric flasks and dilute up to the mark with water.

A-4.4.2 Transfer suitable aliquots of the solutions prepared in **A-4.4.1** to the absorption cell and take photometric readings at 510 nm and plot a curve showing the amount of iron as (Fe) in mg against the readings. Next transfer an aliquot of the sample solution prepared in **A-4.4** to the absorption cell and record the photometric reading.

A-4.5 Calculation — Convert the reading obtained with the sample solution in **A-4.4.2** into milligrams of iron, using the calibration curve and calculate the percentage of iron oxide as follows:

$$\text{Iron Oxide (as } Fe_2O_3 \text{), percent by mass} = \frac{M}{M_1} \times 0{\cdot}142\,9$$

where

M = mass in mg of iron found in the sample solution (**A-4.4.2**), and

M_1 = mass in g of the material represented by 5 ml of the aliquot taken in **A-4.4**.

A-5. DETERMINATION OF TITANIUM DIOXIDE

A-5.0 Outline of the Method — The yellow coloured complex, produced in acid solution of the sample by the addition of hydrogen peroxide, is determined photometrically at approximately 410 nm.

A-5.1 Reagents

A-5.1.1 *Dilute Sulphuric Acid* — 1 : 1 (*v/v*).

A-5.1.2 *Phosphoric Acid* — Add 400 ml of phosphoric acid (relative density 1·75) (*see* IS : 798-1968*) to 500 ml of water, cool and dilute to one litre.

A-5.1.3 *Hydrogen Peroxide* — 20 volumes.

A-5.1.4 *Standard Titanium Dioxide Solution* — Weigh accurately 3 680 g of potassium titanyl oxalate [$K_2TiO_2 (C_2O_4)_2 \cdot 2H_2O$]. Transfer to a boiling flask, add 8 g of ammonium sulphate and 100 ml of concentrated sulphuric acid. Gradually heat the mixture to boiling and boil for ten minutes. Cool, pour the solution into 750 ml of water, and dilute to 1 000 ml in a volumetric flask. One millilitre of this solution is equivalent to 0·5 mg of titanium dioxide (as TiO_2).

A-5.2 Procedure — Transfer 25 ml of the prepared solution (**A-4.2**) to a 100-ml volumetric flasks. Add 2·5 ml of dilute sulphuric acid, 5 ml of phosphoric acid and 5 ml of hydrogen peroxide. Make up to the mark with water and mix.

A-5.2.1 *Calibration Curve* — Transfer 25 ml each of the test blank solution (**A-4.3**) to eleven 100-ml volumetric flasks and add 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 ml respectively of the standard titanium dioxide solution, using the same quantity of reagents and procedure as in **A-5.2.** Make up the solutions up to the mark. Take the required aliquots of these solutions in the absorption cell; one at a time, and plot a curve showing optical densities of solutions at 410 nm against the amount of titanium dioxide in milligrams present in each.

A-5.2.2 Next take appropriate aliquot of the solution prepared in **A-5.2** in the absorption cell and measure its optical density at 410 nm and note from the calibration curve the amount of titanium dioxide in milligrams present in it.

A-5.3 Calculation

$$\text{Titanium dioxide (as } TiO_2 \text{), percent by mass} = \frac{M_1}{M} \times 0{\cdot}1$$

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*Specification for *ortho*phosphoric acid (*first revision*).

where

M_1 = mass in mg of titanium dioxide content present in the aliquot taken for the test (**A-5.2.2**), and

M = mass in g of the material present in the aliquot taken for the test (**A-5.2.1**).

A-6. DETERMINATION OF PHOSPHORUS

A-6.1 Reagents

A-6.1.1 *Phenolphthalein Indicator* — *See* Table 1 of IS : 2263-1979*.

A-6.1.2 *Ditute Nitric Acid* — 10 percent (*v/v*) and 40 percent (*v/v*).

A-6.1.3 *Ammonium Nitrate* — 10 percent (*w/v*).

A-6.1.4 *Standard Sodium Hyroxide Solution* — Carbonate free, 0·1 N (*see* IS : 2316-1968†).

A-6.1.5 *Standard Hydrochloric Acid* — 0·1 N (*see* IS : 265-1976‡).

A-6.1.6 *Ammonia* — Relative density 0·90 (*see* IS : 799-1978§).

A-6.1.7 *Potassium Nitrate Solution* —·1 percent (*w/v*).

A-6.1.8 *Ammonium Molybdate Solution* — Add solution *A* (**A-6.1.8.1**) slowly and with constant stirring to solution *B* (**A-6.1.8.2**) keep cool in a cold water bath. Add 10 ml of ammonium phosphate solution (one gram per litre) and keep the solution at least for 24 hours. Filter the solution through Whatman filter paper No. 1 before use.

A-6.1.8.1 *Solution A* — Dissolve 100 g of molybdic acid (MoO_3, 85 percent) or 118 g of ammonium molybdate in a mixture of 145 ml of concentrated ammonium hydroxide and 270 ml of water. Cool the solution.

A-6.1.8.2 *Solution B* — Add 490 ml of concentrated nitric acid to 1 150 ml of water and cool.

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*Method of preparation of indicator solutions (*first revision*).

†Methods of preparation of standard solutions for colorimetric and volumetric analysis (*first revision*).

‡Specification for hydrochloric acid (*second revision*).

§Specification for ammonia, liquor (*first revision*).

A-6.2 Procedure — Take in conical flask a clear solution of the material, in dilute hydrochloric acid, containing 5 to 10 mg of phosphorus present as orthophosphate in about 75 ml of the solution. Add 10 ml of 10 percent nitric acid and 10 ml of 10 percent ammonium nitrate. Dilute to about 100 ml and maintain the temperature below 30°C. Add ammonium molybdate reagent in small quantities with stirring to precipitate all phosphate present. After the precipitate formed on addition of the reagent has settled, test for completion of precipitation and then add further 10 ml of reagent (generally 20 to 30 ml will be sufficient). Stopper the flask, shake vigorously for 5 to 10 minutes and allow to stand for 30 minutes. Filter through a Whatman No. 40 filter paper or paper pulp. Wash the flask and the precipitate a few times with 1 : 50 nitric acid and then with 1 percent potassium nitrate solution until a portion of the filtrate does not decolourise 1 ml of water containing 1 drop of 0·1 N sodium hydroxide and 1 drop of phenolphthalein. Transfer the paper and precipitate in the original flask. Add a slight excess of 0·1 N carbonate-free sodium hydroxide (say 50 ml). Disintegrate the filter paper or pulp by means of a glass rod. Stopper the flask and shake. If all the precipitate does not dissolve, a further quantity of standard alkali solution shall be added. Dilute to approximately 150 ml, add 5 drops of phenolphthalein indicator, and titrate with standard 0·1 N hydrochloric acid until the pink colour is completely discharged.

A-6.2.1 Carry out a blank determination using all reagents but without the sample in the same manner and simultaneously.

A-6.3 Calculation

$$\text{Phosphates (as } P_2O_5 \text{), percent by mass} = \frac{0{\cdot}308\,8 \times (V_1 - V_2)\,N}{M}$$

where

V_1 = volume in ml of 0·1 N hydrochloric acid consumed for the blank determination,

V_2 = volume in ml of 0·1 N hydrochloric acid consumed by the excess sodium hydroxide solution,

N = normality of standard hydrochloric acid, and

M = mass in g of the material contained in the solution taken for the precipitation.

A-7. DETERMINATION OF CALCIUM OXIDE

A-7.1 Reagents

A-7.1.1 *Dilute Hydrochloric Acid* — approximately 5 N.

A-7.1.2 *Potassium Hydroxide Solution* — approximately 10 N. Before use, shake it to break any film of carbonate which may form on its surface. Allow it to settle and then take out the solution by decantation or, if suspended carbonate particles are still seen, by filtration through glass wool.

A-7.1.3 *Standard Calcium Solution* — 0·01 M. Weigh 1·001 g of calcium carbonate and dissolve in minimum quantity of dilute hydrochloric acid. Make up the volume with water to one litre.

A-7.1.4 *Patton add Reeders' Indicator* — Mix 0·1 g of 2 hydroxy 1-(2-hydroxy-4-sulpho-1-napthylazo)-3-naphthoic acid with 10 g of potassium chloride and grind into a fine mixture.

A-7.1.5 *Standard EDTA Solution* — Weigh 3·72 g of disodium ethylene diamine tetracetate dihydrate (EDTA) and dissolve in water. Make up the volume to one litre, and standardize it as follows:

Take 10 ml of standard calcium solution in a conical flask. Add 20 to 30 ml of water and boil to expel any carbon dioxide. Add 1 to 2 ml of potassium hydroxide solution and cool slightly. Add about 0·2 g of the indicator and titrate with EDTA solution until the colour changes from wine red to pure blue without any tinge of violet.

$$\text{Molarity of standard EDTA solution} = \frac{10\,M_1}{V_2}$$

where

M_1 = molarity of standard calcium solution, and

V_2 = volume of standard EDTA solution required for titration.

A-7.1.6 *Hydroxylamine Hydrochloride* — Solid.

A-7.2 Procedure — Digest 5 g of the material, accurately weigh, in about 50 to 60 ml of dilute hydrochloric acid and boil to expel all carbon dioxide. Cool and make up to 250 ml in a volumetric flask. Mix well and pipette out two portions of 50 ml each, in two conical flasks. Reserve the balance of solution for determination of magnesium oxide.

A-7.2.1 To one flask add 4 to 5 ml of potassium hydroxide solution and then about 50 ml of water. Add about 0·2 g of indicator and quickly titrate roughly against standard EDTA solution until the colour changes to violet blue. Note the volume of titrant consumed and add this volume directly to the second flask. Heat this to boiling, add 4 to 5 ml of potassium hydroxide solution and about 0·2 g of hydroxylamine hydrochloride and boil for a few seconds. Cool by adding about 50 ml of previously boiled and cooled water. Add about 0·2 g of indicator and titrate carefully, shaking after each addition of titrant, until no further change of colour occurs and the test solution is clear blue without any tinge of violet. The titre is the total volume of EDTA solution added to the second flask.

A-7.3 Calculation

$$\text{Calcium oxide (as CaO), percent by mass} = \frac{14 \cdot 02\, V M_2}{M}$$

where

V = volume in ml of standard EDTA solution used for the titration,

M_2 = molarity of standard EDTA solution used, and

M = mass in g of the material taken for the test.

A-8. DETERMINATION OF MAGNESIUM OXIDE

A-8.1 Reagents

A-8.1.1 *Eriochrome Black T Indicator* — Dissolve 0·1 g of eriochrome black T in 25 ml of methyl alcohol.

A-8.1.2 *Ammonium Hydroxide-Ammonium Chloride Buffer Solution* — Mix 350 ml of ammonium hydroxide solution (sp gr 0·90) and 54 g of ammonium chloride. Dilute with water and make up the volume to 1 000 ml. The *p*H of the solution will be more than 10.

A-8.1.3 *Standard EDTA Solution* — Conforming to **A-7.1.5.**

A-8.2 Procedure — Pipette out 20 ml of the solution prepared under **A-7.2** into a one-litre graduated flask and dilute to the mark. Pipette out 20 ml of this diluted solution into a 250-ml conical flask, add 20 ml of water, 1 ml of eriochrome black T indicator and 25 ml of ammonium hydroxide-ammonium chloride buffer solution. Heat to 40 to 50°C and then titrate against standard EDTA solution until the colour changes from wine red to distinct blue. The temperature of the solution should not be allowed to fall below 40°C during titration.

A-8.3 Calculation

$$\begin{array}{l}\text{Magnesium oxide} \\ \text{(as MgO), percent by mass}\end{array} = \frac{25 \cdot 2\, (V_1 - 0 \cdot 008\, V)\, M_2}{M}$$

where

V_1 = volume in ml of standard EDTA solution used in the titration in **A-8.2**,

V = volume in ml of standard EDTA solution used in the titration in **A-7.2**,

M_2 = molarity of standard EDTA solution used, and

M = mass in g of the material taken for the test in **A-7.2**.

APPENDIX B

(*Clause* 5.1)

SAMPLING OF FILTER AID POWDER

B-1. GENERAL REQUIREMENTS OF SAMPLING

B-1.0 In drawing, preparing, storing and handling test samples, the following precautions and directions shall be observed.

B-1.1 Samples shall not be taken in a place exposed to the weather.

B-1.2 The sampling instrument shall be clean and dry.

B-1.3 Precaution shall be taken to protect the samples, the material being sampled, the sampling instrument and the containers for samples from adventitious contamination.

B-1.4 The samples shall be placed in suitable clean, dry, airtight, glass or other suitable containers on which the material has no action.

B-1.5 The sample containers shall be of such a size that they are almost, but not completely, filled with the sample.

B-1.6 Each sample container shall be sealed airtight after filling and marked with full details of sampling, the date of sampling, the year of manufacture and other important particulars of the consignment.

B-1.7 The samples shall be stored in such a manner that during storage the properties of the material do not get affected.

B-2. SCALE OF SAMPLING

B-2.1 Lot — All the containers in a single consignment of the material of the same grade and belonging to the same batch of manufacture shall constitute a lot.

B-2.2 For ascertaining the conformity of the lot to the requirements of the specification samples shall be tested from each lot separately.

B-2.3 The number of containers to be sampled from each lot shall depend on the size of the lot and shall be in accordance with Table 2.

TABLE 2 SCALE OF SAMPLING

LOT SIZE (1)	NO. OF CONTAINERS TO BE SELECTED (2)
Up to 25	3
26 „ 50	4
51 „ 100	5
101 „ 300	6
301 „ 500	7
501 „ 800	8
801 „ 1 000	9
1 001 and above	10

B-2.3.1 The sample containers shall be selected at random. In order to ensure the randomness of selection, procedure given in IS : 4905-1968* may be followed.

B-3. TEST SAMPLES AND REFEREE SAMPLES

B-3.1 Draw with a suitable sampling instrument approximately equal quantity of material from different parts of the container till about 1 kg of material is drawn; divide into three equal parts. Each part so obtained shall constitute an individual somple representing the container and shall be transferred immediately to thoroughly dried bottles which are sealed airtight with glass stoppers. These shall be labelled with full particulars of sampling given in **B-1.6**. One set of test samples shall be sent to the purchaser, another to the supplier and the third kept for the referee.

B-3.2 From the material remaining in each of the containers selected, after individual sample has been taken, small but approximately equal quantities of material shall be taken and mixed together to form a composite sample of the quantity sufficient to make triplicate determination for each of the characteristics tested on the composite sample. The composite sample shall be divided into three equal parts and transferred to thoroughly dried bottles which are sealed airtight with glass stoppers, one of these composite samples shall be marked for the purchaser, another for the suppler and the third for the referee.

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*Methods for random sampling.

B-3.3 The referee samples consisting of a set of individual samples and a composite sample marked for this purpose shall bear the seals of purchaser and the supplier. These shall be kept at a place agreed to between the two and used in case of any dispute.

B-4. NUMBER OF TEST AND CRITERIA FOR CONFORMITY

B-4.1 Individual samples from each container, selected in **B-3.1** shall be tested for the requirements of moisture, ignition loss, specific gravity, bulk density, *p*H and oil absorption.

B-4.2 Composite sample from each lot prepared in **B-3.2** shall be tested for the remaining requirements including that of metallic impurities, if agreed to between the purchaser and the supplier.

B-4.3 The lot shall be considered to have conformed to the requirements of the specification if **B-4.1** and **B-4.2** are found satisfactory.

INDIAN STANDARDS ON ELECTROPLATING CHEMICALS

IS:

261-1965	Copper sulphate, technical
330-1968	Chromium trioxide (*first revision*)
1809-1979	Nickel salts for electroplating (*second revision*)
1880-1977	Zinc oxide and zinc salts for electroplating (*first revision*)
2214-1977	Silver nitrate, pure and analytical reagent (*first revision*)
3026-1968	Tin salts for electroplating (*first revision*)
4846-1968	Sodium potassium tartrate (*Rochelle salte*)
4847-1979	Copper salts for electroplating (*first revision*)
5003-1968	Cadmium oxide for electroplating
5761-1970	Gold cyanide and gold potassium cyanide for electroplating
6267-1971	Silver cyanide and silver potassium cyanide for electroplating
6358-1971	Potassium and sodium cyanides for electroplating
6588-1972	Gold chloride (chlorauric acid)
7038-1973	Chloroplatinic acid (platinic chloride)
7067-1973	Fluoboric acid and metal fluoborates for electroplating
8590-1977	Indium sulphate for electroplating
9341-1979	Sulphamic acid for electroplating
9342-1979	Sodium hypophosphite for electroless plating
9909-1981	Succinic acid for electroless plating
9923-1981	Rhodium salts for electroplating
9924-1981	Palladium salts for electroplating